

EFFECT OF *DELONIX REGIA* LEAF EXTRACT ON GLUCOSE TOLERANCE IN GLUCOSE-INDUCED HYPERGLYCEMIC MICE

Md. Mahafuzur Rahman¹, Md. Nazmul Hasan¹, Asish Kumar Das¹, Md. Tozammel Hossain¹,
Rownak Jahan¹, Mst. Afsana Khatun², Mohammed Rahmatullah^{1*}

¹Department of Biotechnology and Genetic Engineering, University of Development Alternative Dhaka-1205, Bangladesh, ²Dept. of Pharmacy, Lincoln Colleg. Mayang Plaza, Block A, No 1, Jalan SS 26/2, Taman Mayang Jaya, 47301, Petaling Jaya, Selangor Darul Ehsan, Kuala Lumpur, Malaysia
Email: rahamatm@hotmail.com

Abstract

Delonix regia (Fabaceae) leaf is used in folk medicine of Bangladesh for the treatment of diabetes, but so far no scientific study has been done which may support its use in traditional medicine. The present study was carried out to evaluate the possible glucose tolerance efficacy of methanolic extract of *Delonix regia* leaf using glucose-induced hyperglycemic mice. The extract at different doses was administered one hr prior to glucose administration and blood glucose level was measured after two hrs of glucose administration (p.o.) using glucose oxidase method. The statistical data indicated significant oral hypoglycemic activity on glucose-loaded mice at every dose. Maximum anti-hyperglycemic activity was showed at 400 mg/kg which was comparable to that of a standard drug, glibenclamide (10 mg/kg). The methanolic extract of leaf of *Delonix regia* had beneficial effects in reducing the elevated blood glucose level of hyperglycemic mice.

Keywords: *Delonix regia*; Hypoglycemic activity; Serum glucose level; Glibenclamide

Introduction

Delonix regia (Bojer ex Hook.) Raf. (Fabaceae), commonly known as Krishnachura, Gulmohar, Malinche and Tabachine (Cowen, 1984) is grown commonly in different parts of Bangladesh. It is well adapted to the humid tropical climate (Mandal et al., 2008), usually grown as an ornamental tree, and given the name 'Royal Poinciana' or 'Flamboyant'. Plant extract has been reported to possess anti-bacterial, anti-malarial and anti-fungal properties (Aqil and Ahmad, 2007; Ankrah et al., 2003; Dutta et al., 1998). The leaf of this tree is used by the folk medicinal practitioners of Bangladesh for controlling sugar level in diabetic patients. This information suggests that this plant may possess some anti-diabetic activities but no scientific work has been conducted to justify this hypothesis. The present study has been carried out to evaluate the glucose lowering potential of methanolic leaf extract of *Delonix regia* in glucose-induced hyperglycemic mice.

Materials and methods

Collection of plant material

The leaves of *Delonix regia* (voucher No. 34197) were collected during June 2009 from Savar, Dhaka, Bangladesh. The leaves were identified by the Bangladesh National Herbarium, Mirpur, Dhaka and a sample specimen has been kept over there.

Preparation of the test samples

The dried leaves of *Delonix regia* were pulverized into a fine powder and were mixed with methanol at a ratio of 1:5. After 24 hrs, the mixtures were filtered; filtrate was collected and the residue was again mixed with methanol at a ratio of 1:3 for 24 hrs. After filtration, filtrates were combined and evaporated to dryness (approximate yield 7.1%) using rotary evaporator.

Preliminary phytochemical screening

Preliminary phytochemical screening (Kokate, 1994 and Harborne, 1998) revealed the presence of presence of saponins, alkaloids, glycosides, tannins, and steroids).

Animals

Swiss albino mice (male), weighing 25-30g bred in the animal house of ICDDR,B (International Centre for Diarrheal Disease and Research, Bangladesh) were used for the present experiments. All the animals were acclimatized one week prior to the experiments. The animals were housed under standard laboratory conditions (relative humidity 55-65%, room temperature $25.0 \pm 2^{\circ}\text{C}$, and 12 hrs light dark cycle). The animals were fed with standard diet from ICDDR,B and had free access to water. The study was approved by the Institutional Animal Ethical Committee of the University of Development Alternative, Dhaka, Bangladesh.

Studied activity

Glucose tolerance test was performed following the procedure described by Joy and Kuttan (1999) with slight modification. In brief, fasted mice were divided into six groups of seven mice each. Each group received a particular treatment; group-I served as control and received vehicle (1% Tween 80 in water, 10 ml kg^{-1} body weight), group-II received standard drug (glibenclamide, 10 mg kg^{-1}) and the four other groups received the sample extract at four different doses. Each mouse was weighed properly and the doses of the test samples, standard drug, and control materials were adjusted accordingly. Test samples, control, and glibenclamide were given orally. After one hr, all mice were orally treated with 2 g kg^{-1} of glucose. Blood samples were collected two hrs after glucose administration. Serum was separated and blood glucose levels were measured immediately by glucose oxidase method (Venkatesh et al., 2004).

Statistical analysis

The results are expressed as mean \pm S.E.M. Statistical difference was tested by using Student's *t*-test. A difference in the mean *P* value <0.05 was considered as significant.

Table 1: Effect of methanolic extract of *Delonix regia* leaf on serum glucose level in hyperglycemic mice.

Group (n=7)	Treatment	Serum Glucose level (mg/dl)	% inhibition
I	Control	156.4 ± 7.4	-
II	Standard	$81.9 \pm 4.5^*$	47.65
III	Extract (50 mg/kg)	$119.3 \pm 2.8^*$	23.70
IV	Extract (100 mg/kg)	$105.8 \pm 4.7^*$	32.35
V	Extract (200 mg/kg)	$100.0 \pm 5.9^*$	36.05
VI	Extract (400 mg/kg)	$90.0 \pm 2.7^*$	42.46

Extracts and drug were given orally one hour before glucose administration and serum glucose level was measured two hours after glucose administration. Values are given as mean \pm S.E.M. from seven mice in each group. * $P < 0.001$ is significant compared to hyperglycemic control animals.

Results and Discussion

The results obtained from this study indicate that the methanol extract of the leaf of *Delonix regia* has significant glucose lowering capacity at all doses examined in a dose-dependent manner. Maximum hypoglycemic activity (42.46 %) of methanol extract of *Delonix regia* leaves in glucose-induced hyperglycemic mice was observed with a 400 mg kg^{-1} dose, while the standard drug, glibenclamide produced 47.65 % activity at 10 mg kg^{-1} dose (Table 1). The present preliminary experimental results indicated that *Delonix regia* exhibited a potent blood glucose lowering property in glucose-induced hyperglycemic mice. Sterols, triterpenoids or glycosides present in the crude extract may be responsible for the observed pharmacological activity (Venkatesh et al., 2004). A further exploration of the bioactive molecules exactly responsible for this activity is currently under investigation. The mechanism underlying the glucose lowering efficacy of *Delonix regia* is yet to be established but we can speculate that the glucose lowering activity of the extract may be by potentiating the pancreatic secretions of insulin or increasing the glucose uptake. The obtained results provide a pharmacological evidence for its folklore claim as an anti-diabetic agent.

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